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Springboard

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Project Proposal

Problem Statement

How does Naturopathic Medicine and Traditional Chinese Medicine herbs, such as Danggui Shaoyao San and Rhodiola Rosea, affect the gut microbiome and thus colonic and overall gene expression, to reduce or prevent the progression of Alzheimer's disease and its pathologies?

Context

The Secretary of the Department of Health has declared for many years the public health crisis of opioids is an ongoing federal problem that United States citizens face. Alzheimer's is another public health issue because the gravity of this disease is very serious, and can be fatal. Today, "nearly 7 million Americans live with Alzheimer's" [1], and "the cost of care yearly is \$360 billion" [2]. "10% of adults aged 45 and older report subject cognitive decline" [3], which is the earliest warning sign of Alzheimer's disease. "By 2050, nearly 13 million Americans could be living with Alzheimer's [4], where costs will reach nearly \$1 trillion" [5].

Criteria for Success

Successful criteria shall include...

- Mapping the effects of Danggui Shaoyao San on the gut microbiome.
- Mapping the effects of Rhodiola Rosea, on the gut microbiome.
- Mapping the effects of Danggui Shaoyao San on colonic and overall gene expression.
- Mapping the effects of Rhodiola Rosea on colonic and overall gene expression.
- Mapping the relationship between Danggui Shaoyao, the gut microbiome, colonic, and overall gene expression, and whether it reduces or prevents the progression of Alzheimer's disease and its pathologies.
- Mapping the relationship between Rhodiola Rosea, the gut microbiome, colonic, and overall gene expression, and whether it reduces or prevents the progression of Alzheimer's disease and its pathologies.
- Determining which herbal supplement is more efficacious at preventing or reducing Alzheimer's disease and its pathologies.
- Determining a recommended course of action with these two supplements, and how Naturopathic Medicine and Traditional Chinese Medicine fit as a whole into the conclusions of the problem statement.

Scope of Solution Space

The scope of the solution space is the complexities of Naturopathic Medicine, Traditional Chinese Medicine, the gut microbiome, the gut-brain axis, genetics and gene expression, and the pathology of Alzheimer's and other dementias. Each of these areas may be quite deep in its own respects, so only what pertains to answering the problem statement will be included, alongside with any supplemental information with the scope above to aid in answering the formalized problem statement.

Constraints

The constraints to the problem statement include time constraints, considering that the scope of the work touches on so many disciplines that are their own doctorate in their own respects, so time constraints with respect to understanding and utilizing the information within the datasets at hand are the largest constraint.

Stakeholders

Stakeholders in this capstone project are Rajib Biswas my Data Science mentor, Springboard School of Data Science, a hypothetical supplement company that sells Rhodiola Rosea and Danggui Shaoyao San desiring to review conclusions for their own R&D, for deciding how to market their supplements as whether or not they prevent Alzheimer's, and managers at companies for whom I am interviewing at, with whom I have to pleasure of demonstrating this project.

Data Sources

https://figshare.com/articles/dataset/Table5_Danggui_Shaoyao_San_comprehensive_modulation_of_the_microbiota-gut-brain_axis_for_attenuating_Alzheimer_s_disease-related_pathology_XLSX/24987513

<https://www.omicsdi.org/dataset/geo/GSE113257>

https://figshare.com/articles/dataset/Table_4_Exploring_the_Key_Genes_and_Identification_of_Potential_Diagnosis_Biomarkers_in_Alzheimer_s_Disease_Using_Bioinformatics_Analysis_XLSX/14777766/1

<https://datadryad.org/stash/dataset/doi:10.7280/D1FX2D>

Works Cited

[1], [2], [3], [4], [5] Alzheimer's Association. "Public Health Approach." *Alzheimer's Association*, <https://www.alz.org/professionals/public-health/public-health-approach>. Accessed 18 July 2024.